



Physics and Metallurgy Lib

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TECHNICAL ABSTRACTS

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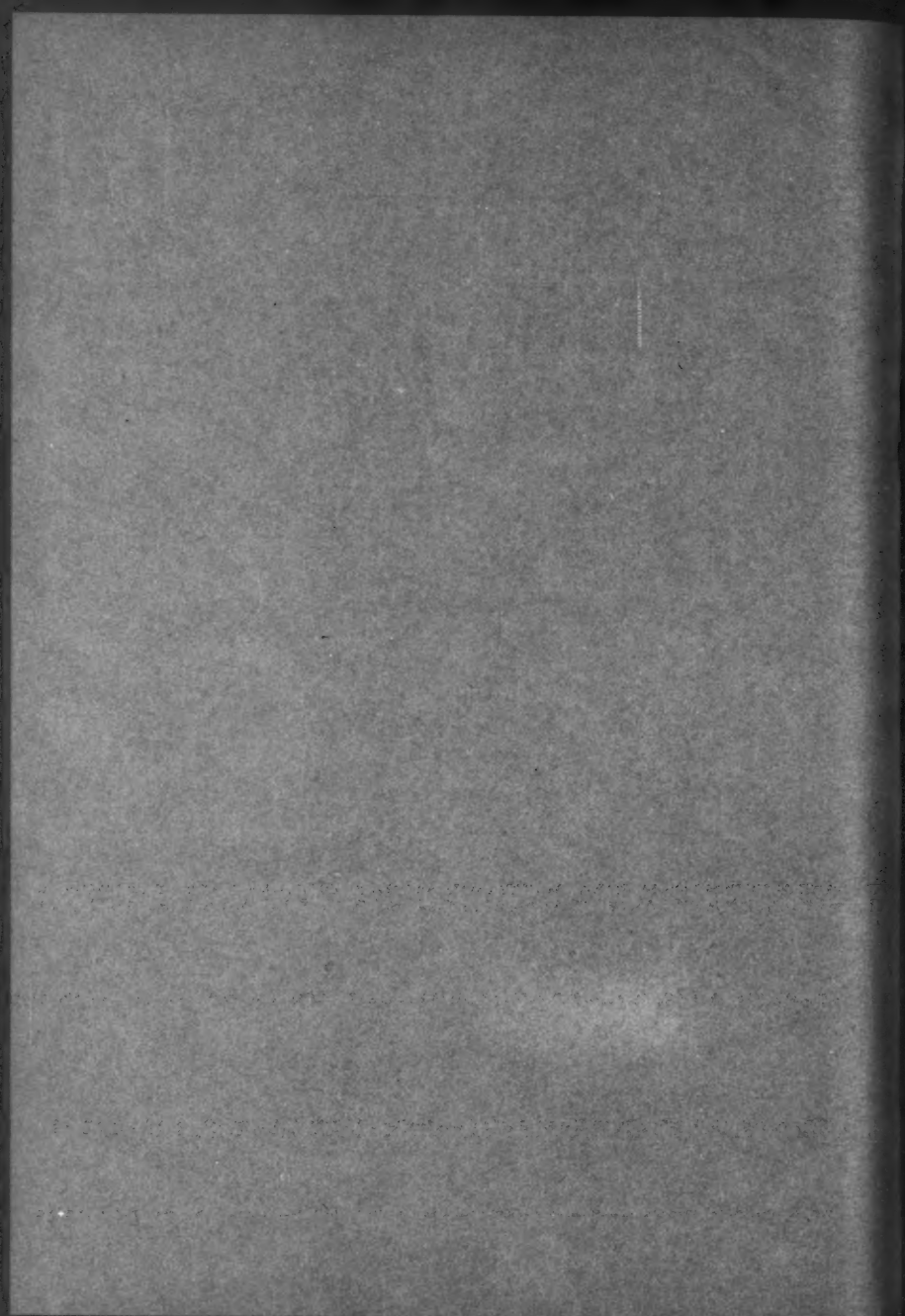
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LEAD ABSTRACTS

**A Selection of Abstracts of Literature and Patents
on the Utilisation of Lead
and its Alloys**

No. 7 APRIL 1960

Technical Papers	353 to 384
Patents	385 to 408

ISSUED BY THE
LEAD DEVELOPMENT ASSOCIATION
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C O N T E N T S

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In the event of books, documents, articles and patents, quoted in Technical Abstracts, being unobtainable from or through local libraries, technical booksellers (many of whom provide an international service) or appropriate government departments, applicants should notify their difficulties to the Association, which will do its best to assist.

PART I

TECHNICAL PAPERS

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ANALYSIS

- 353 A METHOD OF EVALUATION, IN QUANTITATIVE X-RAY FLUORESCENCE ANALYSIS, OF SYSTEMS CONTAINING SEVERAL ELEMENTS** *H. Preis and A. Eesenwein*

Schweizer Archiv, Nov., 1959, 25(11), 415-418.

(In German.) Method is described using type metals as example.

- 354 PHOTOMETRIC DETERMINATION OF TIN IN COPPER-BASE AND LEAD-BASE ALLOYS** *C. L. Luke*

Anal. Chem., Nov., 1959, 31(11), 1803-1804.

From 0.1-25% tin in lead-base or copper-base alloys is determined by a rapid photometric phenylfluorone method. The method, which can probably be adapted to analysis of several other alloys, requires no separations.

- 355 PHOTOMETRIC DETERMINATION OF (TRACES OF) ANTIMONY AND THALLIUM IN LEAD** *C. L. Luke*

Anal. Chem., Oct., 1959, 31(10), 1680-1683.

Because of inaccuracies arising from the removal of lead as sulphate the present method has been devised. Elements are co-precipitated with manganese dioxide and photometric determination is carried out with Rhodamine B.

- 356 COMPLETE ANALYSIS OF MANGANESE BRONZE, LEAD BEARING ALLOY AND WHITE METAL (WORKS ANALYSES)** *A. Klinkmann*

Metall, Nov., 1959, 13(11), 1045-1049.

(In German.) Details of analytical methods for determining major and minor constituents of (a) white metals containing traces of iron, nickel and zinc, (b) lead-antimony-tin bearing alloys with traces of copper, cadmium, arsenic and nickel and (c) manganese bronzes.

BEARINGS

- 357 FRICTION AS A PHYSIOCHEMICAL SOLID BODY PROBLEM: INFLUENCE OF THE PLASTICITY OF THE METAL ON THE KINETICS OF THE FRICTION** *A. Knappwost and E. Burkard*

Z. Metallkunde, Sept., 1959, 50(9), 540-545.

(In German.) Coefficient of friction depends on the normal force and sliding speed for the lubricated pairs, Iron/Aluminium, Iron/Tin, Iron/Tin-Lead.

358 WHITEMETALS IN SHIPS

P. T. Holligan

Reed's Marine Equipment News, Sept., 1959, 3(9), 1-3.

Complete description of techniques of lining bearings, relining practice, backing materials, types of whitemetal used and the advantages of this type over other bearings for ships.

COATINGS

359 PROTECTIVE COATS OF SPRAYED METALS

H. Reiningner

Werkstoffe u. Korrosion, Aug., 1959, 10(8), 477-489.

(In German.) A survey of recent uses of lead, zinc and aluminium sprayed coatings on steel structures. Measurement of, and variations in, thickness are discussed and the advantages of mechanical over hand spraying are described.

360 LEAD PLATING FROM THE PYROPHOSPHATE BATH

V. Sree

J. Sci. Ind. Res. (India), Oct., 1959, 18A(10), 478-489.

Pyrophosphate baths for plating lead are claimed to have good throwing power. The potassium salt is found to be better than the sodium and the article gives comparisons with fluoroborate and sulphamate baths. The composition of the preferred electrolyte is lead nitrate 33.2 (g/l); total pyrophosphate 78, glue 1. A temperature of 60°C is recommended and the current density should be limited to 3.5 amp/sq. dm.

CORROSION

361 (1) MICRO-ORGANISMS AND CORROSION OF LEAD-SHEATHED CABLES. (2) IS THE PHENOL CORROSION THEORY FALSE?

(1) G. Bunde and
B. Lunn

(2) H. L. Halstrom

Ingeniören (International Edition), 1958, No. 3, pp. 103-107, 108-109.

It is suggested that the term "phenol corrosion" is erroneous. It is shown that some bacterial decomposition of jute gives rise to organic acids, which are corrosive. This organism has been found in cables which were supposed to have suffered "phenol corrosion".

362 THE PERMANENT ANODE IN IMPRESSED-CURRENT CATHODIC PROTECTION SYSTEMS. PART 1 AND 2

C. A. Curtis

Corrosion Tech., Oct., Nov., 1959, 6(10, 11), 296-298, 333-334, 342.

(1) General paper on impressed-current cathodic protection dealing mainly with graphite, silicon-iron and scrap steel. (2) Deals with lead, platinised lead and platinised titanium as permanent anodes.

**363 SERVICE EXPERIENCE WITH LEAD-SILVER
ALLOY ANODES IN CATHODIC PROTECTION
OF SHIPS**

*K. N. Barnard,
G. L. Christie and
D. G. Gage*

Corrosion, Nov., 1959, 15(11), 581t-586t.

Comparison of lead/2% silver alloy and lead/1% silver/1% tin. The former is considered better and tested further. Installation methods and operational experience described. Lead alloy anodes are preferred to platinum and graphite systems and show some advantages over steel and magnesium anodes.

ELECTROLYSIS

**364 STUDY OF THE STRUCTURE OF ELECTRO-
DEPOSITS ON SINGLE CRYSTAL CATHODES.
1.—LEAD**

*G. Poli and
L. Peraldo Bicelli*

Metallurgia Italiana, Sept., 1959, 51(9), 399-406.

(In Italian). Deposits are obtained from perchlorate and fluoborate baths on lead single crystals. X-ray diffraction studies show that deposits on (100) and (110) faces follow the pattern of the underlying crystal lattice. Above certain critical values of current density and thickness deposits, on (111) faces show a tendency to twinning.

METALLOGRAPHY

**365 A METHOD OF ELECTROPOLISHING DILUTE
ALLOYS OF LEAD (FOR METALLOGRAPHIC
PURPOSES)**

*P. Gregory,
K. M. Ginsburg and
R. J. G. Woods*

Metallurgia, Oct., 1959, 60, 171-172.

The introduction of more complex lead alloys for cable sheaths gives rise to an investigation of electropolishing methods. Satisfactory results were obtained with an electrolyte of acetic acid, sodium acetate and water. Different compositions used for different alloys.

**366 ETCHING LEAD FOR EXAMINATION IN POLAR-
IZED LIGHT**

*R. C. Gifkins and
J. M. Nicholls*

J. Inst. Metals, Oct., 1959, 5(2), 96.

After chemical polishing, specimens are etched in a bath containing an aqueous solution of acetic acid, hydrogen peroxide and ethyl alcohol.

METALLURGY

367 RECRYSTALLISATION OF ZONE-REFINED LEAD

G. F. Bolling

Nature, Aug. 29, 1959, 184, 718-719.

Measurements of the recrystallisation temperature of lead show that it is lowered as purity increases. Experiments are carried out on Tadanac lead (99.999%) and zone-refined lead (99.9999%).

- 368 REACTION EQUILIBRIUM BETWEEN MOLTEN LEAD AND METALLIC OXIDES. 3.—INTERPRETATION OF THE OXIDATION MAXIMUM OF ANTIMONY IN LEAD REFINING** *E. Pelzel*

Erzmetall, Nov., 1959, 12(11), 558-561.

(In German.) This deals with the reaction equilibrium lead-antimony-oxygen, and also the liquidus curves lead-antimony trioxide and lead oxide-antimony trioxide. Also discusses the oxidation maximum.

- 369 RECRYSTALLISATION OF LEAD OXIDE FROM MOLTEN LEAD** *D. G. Bradhurst and A. S. Buchanan*

Australian J. Chem., Aug., 1959, 12(3), 523-524.

Microscopic observation of drops of molten lead on uranium oxide plaques is used to determine the solubility of lead monoxide in 99.999% lead (0.42% at 750°C).

- 370 QUENCH-AGEING IN ANNEALED LEAD** *E. J. Hooker*

J. Inst. Metals, Sept., 1959, 88(1), 44-45.

Pure lead (99.99% +) which is melted and solidified in either hydrogen or in air, exhibits room temperature age-hardening. This cannot be ascribed to impurities and it is suggested that condensation of quenched-in vacancies may be responsible.

POWDER METALLURGY

- 371 INFILTRATION OF IRON POWDER WITH TIN-LEAD ALLOY** *T. Kimura*

Planseeberichte für Pulvermetallurgie, Aug., 1959, 7(2), 50-56.

Infiltration of carbonyl iron powder by 50/50 lead-tin solders does not occur until far above the liquidus temperature of the solder. The infiltration temperature can be reduced by pre-treatment of the powder with certain chemicals and infiltration in vacuo or in hydrogen or argon. The effect on tensile and bending properties is also studied.

REFINING

- 372 INVESTIGATIONS ON THE DECOPPERING OF LEAD IN THE PRESENCE OF TIN, ARSENIC AND ANTIMONY. PART 2** *H. Hartmann, F. Ensslin and E. Wunderlich*

Erzmetall, Nov., 1959, 12(11), 537-543. (Concluded).

(In German.) Discusses various quaternary systems of lead involving copper-tin-arsenic-antimony and the pentenary system of the above elements. In each case experiments on sulphur treatment and decoppering are described.

**373 INVESTIGATION OF METAL (STEEL) QUALITY
FOR LEAD REFINING KETTLES**

*A. P. Rogach,
A. P. Ryzhikova and
P. M. Slivinskii*

Tsvetnye Metally, Nov., 1958, 31(11), 32-36.

(In Russian.) Investigations of causes of failures and recommendations for improvements. Discusses use of titanium-bearing steel.

**374 INFLUENCE OF THE COMPOSITION OF THE
CHARGE ON THE RECOVERY OF LEAD IN
WAEZ FURNACE TREATMENT OF WASTE ZINC
CAKE**

*V. A. Leitsin and
A. M. Gorbunov*

Tsvetnye Metally, May, 1959, 32(5), 59-62.

(In Russian.) Increases in the lead and copper contents in the charge for this process both appear to increase the lead content of the residues.

**375 INTRODUCING AN ELECTROTHERMIC METHOD
OF DISTILLING ZINC FROM SILVER CRUSTS AT
THE SOUTH KAMENOGORSK LEAD WORKS**

*D. O. Averchenkov
and others*

Tsvetnye Metally, Jan., 1959, 32(1), 33-40.

(In Russian.) Describes the plant and its method of operation for removing zinc from the crust produced in the desilverizing of lead. Figures are given for throughput and analyses of skimmings.

SINTERING

376 UPDRAFT SINTERING OF LEAD CONCENTRATES

*H. B. Wendeborn,
M. O. Peucker and
W. P. Massion*

J. of Metals (U.S.A.), Nov., 1959, 11(11), 748-751.

This process was originally tried by Huntington and Heberlein in 1898 and the process now in use was developed simultaneously but independently by B.H.A.S. at Port Pirie and Lurgi Gesellschaft at Frankfurt.

SMELTING

377 THE SMELTING OF BATTERY SCRAP

E. Liebscher

Neue Hütte, July, 1959, 4(7), 417-419.

(In German.) Blast furnaces, reverberatory furnaces and short rotary furnaces are included in a survey of current practice.

**378 SMELTING METALLIC LEAD AND ZINC IN ONE
OPERATION**

*B. G. Perry and
D. A. Temple*

Erzmetall, Oct., 1959, 12(10), 479-486.

(In German.) Refers to Imperial Smelting process, considering economic aspects and future possibilities.

- 379 PRODUCTION OF LEAD AT THE LEAD-ZINC WORKS IN KRZDZHALI (BULGARIA)** *N. Kunchev and others*
Tsvetnye Metally, Oct., 1959, 32(10), 25-34.
(In Russian.) Detailed description includes analyses, lead recovery figures, flow-sheet and materials balances.
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- 380 MASTERING THE PROCESS OF SULPHATING LEAD DUSTS** *L. S. Getskin and others*

Tsvetnye Metally, Oct., 1959, 32(10), 35-42.

(In Russian.) Recovery of lead from dusts containing under 50% lead by granulating with sulphuric acid, heating in a fluidised bed reactor and leaching. 98% of the lead present has been recovered.

- 381 USE OF LIQUID AND GASEOUS FUELS IN THE FUMING PROCESS (Zn, Sn, Pb).** *V. V. Kostelov and B. F. Verner*

Tsvetnye Metally, Sept., 1959, 32(9), 45-48.

(In Russian.) Recovery of lead, tin and zinc from slags by fuming is said to be more efficient when liquid fuels, such as petroleum residues, are used instead of coal or gas.

- 382 EXPERIENCE IN THE USE OF OXYGEN IN THE LEAD BLAST FURNACE** *A. M. Vartanyan and D. S. Kopchenko*

Tsvetnye Metally, May, 1959, 32(5), 46-49.

(In Russian.) A 20-27% increase in furnace throughput, 13% reduction in coke and reduced lead losses in the slag are among the advantages claimed to result from enrichment of the oxygen content of the blast to 25-27%.

SOLDERS

- 383 SPECIAL SOLDER FOR USE IN CRYOGENIC CIRCUITS** *A. W. Grobin, Jr.*

Rev. Sci. Instruments, Nov., 1959, 30(11), 1057.

For soldering wires to silver tabs fused onto glass substrates which may be repeatedly immersed in liquid helium, a special solder (19% lead, 30% tin, 50% indium, 1% silver) is used, which has a melting point of 130°C and a resistivity of 12.5×10^{-6} ohm-cm.

STATISTICS

- 384 METAL STATISTICS, 1949-1958. 46th ANNUAL ISSUE** *Metallgesellschaft A.G.*

Book, 1959, 248 pp. Metallgesellschaft A.G., Frankfurt a/M.

Contains the usual statistics on lead and other metals including production, consumption, scrap recovery, etc.

PART II

PATENTS

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ANALYSIS

385 RUSSIAN PATENT 121,264. "SPECTROGRAPH WITH PHOTO-ELECTRIC CELL"

G. A. ISMAILOV

In this patent the photo-electric cell, which is mounted in the focal plane, is previously charged. It is claimed that the apparatus is simple and cheap, and, on account of its ability to integrate, errors due to fluctuations can be excluded, and accuracy and reliability increased thereby.

BATTERIES

386 GERMAN PATENT 1,069,725. "SEPARATORS"

R. BOSCH G.m.b.H.

Battery separators made from wood pulp paper which may have had part of the lignin removed. This type of separator is claimed to reduce the self-discharge of a battery.

387 INDIAN PATENT 64,970. "TUBULAR PLATES"

CHLORIDE BATTERIES LTD.

The tubes containing the paste, are of oxidation resistant yarn and fitted with a thin internal liner made from glass fibre.

388 INDIAN PATENT 66,321. "SEPARATORS"

W. R. GRACE & CO.

These separators have ribs on at least one face, made from a material which expands when immersed in the electrolyte.

389 BRITISH PATENT 817,885. "COMPOSITION OF GRID"

CHLORIDE ELECTRICAL STORAGE CO. LTD.

The body of the positive grid is made from an alloy 0.03-0.10% calcium, 1-2% tin, 0.01-0.10% aluminium, balance lead. The unit is then coated with about 5 thousandths of an inch of pure lead, the object being to prevent inter-crystalline corrosion. These grids are claimed to have a longer life and slow self-discharge.

390 GERMAN PATENT 1,071,172. "MICROPOROUS SEPARATORS"

ACCUMULATOREN-FABRIK A.G.

The separators are formed from very uniform plastic granules sintered together. P.V.C. is a suitable plastic and the grain size should be between 0.05-0.15 m.m. The sintering temperature is about 250°C, and the time about 30 secs.

391 BRITISH PATENT 826,855. "FILLING WITH ELECTROLYTE"

YARDNEY INTERNATIONAL CORPORATION

First, the air within the battery is displaced by a gas, preferably heavier than air, and capable of dissolving in acid, such as ammonia, methylamine or ethylamine. Connection with the acid is then established through the top of the casing, i.e., through a vent-hole, and as the gas dissolves in it, a partial vacuum is formed and the acid is drawn into the casing, a rapid and complete permeation thereby resulting.

392 GERMAN PATENT 1,071,788. "METAL FLEECE ELECTRODE"

ACCUMULATOREN-FABRIK A.G.

Porous metal fibre electrode for, say, a battery, can be made by manufacturing a fibre unit of organic material, carbonising until a skeleton of conducting carbon remains, and then metallising externally.

393 RUSSIAN PATENT 123,213. "MACHINE FOR ROLLING PASTED PLATES"

I. D. SLUZHEVSKII

The plates after pasting are carried between two endless fabric belts and are subjected to pressure from rollers mounted outside the belts. The belts are washed, squeezed and dried during the cycle. The drying device is in the form of a vacuum suction nozzle.

CABLES

394 BRITISH PATENT 828,177. "LEAD FOIL/ALUMINIUM SHEATH"

STANDARD TELEPHONES & CABLES LTD.

Aluminium sheaths on cables can be protected by lead foil, in the form of a strip, the width being slightly greater than the circumference of the cable. This is wrapped round the cable and a seam is formed by folding the two edges of the strip over one another with a sealing compound enclosed between them. The folded seam is then bent over and bedded down.

CASTING

395 BRITISH PATENT 827,262. "CONTINUOUS CENTRIFUGAL CASTING"

METALLURGIQUE D'ESPERANCE LONGDOZ S.A.

A quantity of molten heavy metal, such as lead, is first run into the mould. The metal to be cast is next introduced and the effect of the lead lining is to reduce the friction between the casting metal and its container. Lining metal, as well as being denser than the casting metal, must also have a suitable melting/boiling range, and must not cause any contamination of the product.

396 BELGIAN PATENT 576,739. "MANUFACTURE OF PROTECTIVE SCREENS"

KNAPP MILLS INC.

A protective screen of lead, presumably for nuclear shielding applications, is obtained by cooling a molten layer of lead at a specified rate in a controlled direction. Before all the metal has solidified more molten lead is added and the process repeated until the container is full.

CORROSION

397 RUSSIAN PATENT 122,638. "APPARATUS FOR TESTING METAL CORROSION"

M. K. DOBELIS

Specimens to be tested are hung on a horizontal bar which is supported at its centre by a float. The latter floats on transformer oil and is equipped with a metal rod which is used as the core of an electromagnet situated outside and below the oil container. When the current is switched on, the float is pulled down, and the metal specimens thus immersed in appropriate corrosive solutions which are placed immediately beneath them. Samples can thus be dipped automatically at pre-determined intervals.

ELECTRONICS

398 GERMAN PATENT 1,073,207. "LEAD-SELENIUM-TELLURIUM ALLOY" MINNESOTA MINING & MANUFACTURING CO.

An alloy having the composition of 35%-38.05% tellurium and 25%-27.55% selenium, balance lead, has a high efficiency of thermoelectric conversion when used as the negative arm of a thermoclement. It is best made by melting the constituents together at 920-1100°C, casting and subsequently annealing at 650-750°C for 10-20 hours.

FLOTATION

399 BRITISH PATENT 824,661. "FROTHING AGENT FOR FLOTATION PROCESS"

FARKWERKE HOECHST A.G.

By attaching a short ethylene oxide chain to saturated monohydric aliphatic alcohol of medium chain length, a frothing agent can be obtained, which is far superior to the original alcohol, and even to terpene alcohols, although the surface activity of the basic alcohol is scarcely changed. It can be employed with advantage in the flotation of lead, lead-zinc or copper ores.

400 SOUTH AFRICAN PATENT 59,2703. "APPARATUS FOR FROTH FLOTATION"

LORO & PARISINI S.p.A.

In this device the slurry is fed into the tank above the level of the agitator, but well below the zone in which the froth is forming.

401 RUSSIAN PATENT 125,207. "FLOTATION OF OXIDE AND SULPHIDE ORES"

A. N. GREBNEV et alia

This patent relates to the use of sodium dicyclohexyldithiocarbamate, formula—
$$\text{Na}[(\text{C}_6\text{H}_{11})_2\text{NCS}_2]\cdot 3\text{H}_2\text{O}$$

This substance in concentration of approximately 1.5 mol per ton will separate cerussite without prior sulphurisation.

LEADED STEEL

402 BELGIAN PATENT 579,958. "ADDING LEAD TO STEEL"

INLAND STEEL CO.

Molten steel is poured into a bath of molten lead, the two liquids allowed to separate by gravity, and the lead run off. The steel, on solidification, is found to contain a small amount of finely dispersed lead in the order of 0.2%–0.35%.

OXIDES

403 GERMAN PATENT 1,074,023. "APPARATUS FOR OXIDE FORMATION"

SOC. de l'ACCUMULATEUR FULMEN S.A.

Molten lead is oxidised by feeding it tangentially at high speed at between 377°C and 577°C along the wall of a chamber containing an inert atmosphere, after which it passes downwards through an axial opening to a second chamber placed below the first. Air is fed tangentially into the second chamber where oxidation occurs, and the metal oxide passes out through a lower axial opening. The conditions can be varied so that a wide range of oxides can be obtained in varying compositions.

REFINING

404 BRITISH PATENT 817,893. "ELECTROLYTIC REFINING"

P. HERASYMENKO

The subject of the patent is an anode which operates in an electrolytic cell working in a temperature range of 500–1200°C. This anode is made of an alloy of the metal to be refined, and a more noble metal which has a lower melting point than the former. At the commencement of the electrolysis the composition is such that the anode is solid, but as the less noble metal is progressively removed it becomes liquid. The noble metal may be cadmium, tin, lead or bismuth.

405 BRITISH PATENT 826,864. "CENTRIFUGAL REFINING TREATMENT OF MOLTEN METAL"

G. PEMETZRIEDER

A number of cylindrical chambers are arranged along a common axis of rotation. In each separating wall there is a duct leading from the outer portion of one chamber to the centre portion of the next, and the whole unit has inlet and outlet ducts at the two end chambers respectively.

406 RUSSIAN PATENT 117,793. "MECHANISED MEANS OF REMOVING ANODES FROM CASTING MACHINES"

M. P. CHERNOV

A frame rotating in a horizontal plane engages two hooks with the lugs of the cast anode as the latter is pushed up from the casting mould. The rotation of the frame lifts the anode from the mould and deposits it into a cooling water tank, the lugs resting on the edges of the tank. The anode is then pushed forward in the tank to make room for the arrival of the next.

SOLDERS

407 RUSSIAN PATENT 125,725. "SOLDER FOR ALUMINIUM"

A. G. VEINGARDT

In using this improved lead tin solder for aluminium, the oxide film is removed by means of abrasive brass shavings. Any abrasive matter thus accidentally retained by the solder is consequently fused into it, and a strong and uniform seam results.

TESTING

408 GERMAN PATENT 1,073,772. "VISCOSITY DETERMINATION"

ALUMINIUMWERKE NURNBERG G.m.b.H.

This determination is effected by immersing a hollow container in the molten metal until the temperatures are equal. A port in the bottom of the container is then opened and the time required for the container to fill to a predetermined level is noted. This method of measuring viscosity is related to conditions prevailing in the production of a casting, and it is for this purpose that the information is principally required.



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